term involving the error of eccentricity of the terrestrial meridian. I need hardly say that the amount of doubt on this point is so small now that such observation could not be affected. But there has of late years arisen a very serious doubt as to the accuracy of geometric latitudes deduced from the astronomical or observed values. I think it is generally believed that there is everywhere some deflection of the plumb-line from the place it would have were the Earth constituted by law, and that in many places this amount is of importance.

We have no means of determining an absolute amount of meridian deflection, or a real geocentric latitude, except by the changes which the use of a wrong one produces in the resulting places of the Moon. I have before called attention to this (*Monthly Notices*, xvii. 62, paras. 14–15), and I would now propose that in a new edition of Chauvenet, or in any new work, the useless equation should be omitted, and that in lieu should be given two; one for the correction to the geometric latitude, and the other for a correction to the calculated radius vector of the Earth, which I have also shown (*Monthly Notices*, xvii. 236), may in some cases be sensibly affected.

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## *Errors and Omissions in the Catalogue of Sir William Herschel's Double-Stars.* By S. W. Burnham.

In the preparation of a general catalogue of double-stars I have had occasion to examine carefully Sir John Herschel's catalogue of his father's double-stars (*Memoirs of the Royal Astronomical Society*, vol. xxxv.), in connexion with various other catalogues, and in so doing have detected some errors, a record of which may be of service to double-star observers.

Sir John Herschel has undertaken to give in the column of "Synonyms and Remarks," the corresponding number of the double-star where it is found in the catalogues of Struve (*Mensuræ Micrometricæ*); Herschel and South (*Phil. Trans.* 1824); and South (*Phil. Trans.* 1826); but in many instances this has been overlooked. A number of them are also included in Sir John Herschel's own catalogues published in the various *Memoirs* of the Royal Astronomical Society.

### *Class I.*

No. 13 (*Aquilæ* 136), *for* Σ 2541, *read* Σ 2525; and *for* S. 770, *read* S. 720.

36 (ξ *Herculis*), *add* Sh. 237.

48 This is identical with a double discovered by Alvan Clark in 1859, and heretofore regarded, by Dawes and others, as new. Herschel in 1783 made the angle 259°·8; Dawes in 1859 found it 246°·1; and it decreased by his measures about 2° in the seven years following (*Memoirs of the Royal Astronomical Society*, vol. xxxv. p. 468.) It is No. 103 of Chambers' *Catalogue of Binary Stars.*

63 *Add* S. 778.

64 ($\pi$ *Arietis*), *for* Sh. 82, *read* Sh. 35.

81 (*Serpentis* 112), there can be no doubt of the identity of this triple with Σ 1990 (= S. 675.) Struve gives for the wide pair D = 56″·17; P = 59°; and Herschel's measures are D = 56″·47; P = 238°·2 (58°·2.) Struve's position angle of the other star is 209°; and Herschel's, 210°.

84 *Add* S. 526.

91 *Add* S. 723.

94 ($\delta$ *Cygni*), *add* Sh. 304.

## *Class II.*

No. 21 *Add* Sh. 215.

32 This is identical with H. N. 84, the places of the two, and the distance agreeing exactly.

42 This double is in one of Sir John Herschel's own catalogues of double-stars (= H 219.)

62 This is H. 3041 = O Σ 443.

66 *Add* S. 764.

70 *Add* S. 734.

72 *Add* S. 531.

86 *Add* Σ 2016.

97 *Add* S. 775.

## *Class III.*

No. 16 *Add* S. 751.

17 *Add* Sh. 341.

28 "Near 9 *Argûs*; place very doubtful." This star is Lalande 15389; it follows 9 *Argûs* $41^s$, and is 1′ 26″ north.

48 One of Sir John Herschel's doubles (= H. 422.)

71 *Add* S. 795.

110 "Identification uncertain." This triple is O Σ 447, the measures corresponding very closely.

113 *A* and *B* of this quadruple constitute Sh. 314; and *D* and *E* Sh. 315.

## *Class IV.*

No. 15 (*Camelop.* 212), *for* Σ 1674, *read* Σ 1694.

22 ($f^2$ *Cygni*), *add* Σ 2743.

23 ($\omega^3$ *Cygni*), this is not $\omega^3$ *Cygni*, but is P. xx. 199; *add* S. 755, and *for* Σ C. P. 684, *read* Σ C. P. 683.

24 This is $\omega^3$ *Cygni* (= H. 1534), *for* Σ C. P. 682, *read* Σ C. P. 684.

45 *Add* Sh. 57.

71 (*o Capricorni*), *add* Sh. 324.

73 There is no doubt of the identity of this with Σ 587.

77 This is not Sh. 73 as stated.

92 *Add* S. 759.

94 *Add* Sh. 273.

127 This is not Sh. 285, that pair being Σ 2434, nor is it P. xviii. 274, unless Struve has erred in attaching that number from Piazzi to his pair. The two double-stars are in the same vicinity, Herschel's being the brightest and perhaps correctly designated from Piazzi.

132 Erroneously stated to be the same as H. N. 62. The two differ in Right Ascension more than three hours.

## *Class V.*

No. 1 (*δ Herculis*), *add* Σ 3137.

7 (*μ Sagittarii*), this is also H. 2822 (*Cape Observations.*)

18 (*θ Cassiopeiæ*) = H. 1993.

54 (*θ Hydræ*) = H. 2489.

59 (*θ Cancri*) = H. 2452.

72 (36 and 37 *Herculis*), *add* Sh. 2*4.

76 (*β Aquarii*) = H. 936.

80 (*τ Aquarii*), *add* Σ 2943 and S. 817.

105 Identical with O Σ 397.

115 (*ο Tauri*), this is H. 365 with two other companions.

122 (*Boötis* 346), *for* Sh. 119, *read* Sh. 189 (= O Σ 291.)

131 (*Libræ* 97), *for* Σ 476, *read* Σ C. P. 476, referring to Struve's early catalogue (*Dorpat Obs.* 1822.)

## *Class VI.*

No. 29 (*ϱ Capricorni*), *for* H. II 57 (the close pair), *read* H. II 51.

55 (2 *Cassiopeiæ*), *add* S. 823.

57 (79 *Cygni*), this is not included at all in the synoptical catalogue which follows where the several classes are arranged in order of Right Ascension.

96 (*ξ Persei*) = H. 337.

## 145 *New Double-Stars.*

11 *Add* Sh. 352.

13 *Add* Sh. 303.

33 (*Libræ* 178), *add* Sh. 206.

36 (35 *Sextantis*), *add* Σ 1466.

42 (13 *Lacertæ*) = H. 1803 = O Σ 479.

61 (20 *Lyncis*), *add* Σ 1065.

98 This is omitted in the catalogue arranged in order of Right Ascension (= Σ 1813)

109 *Add* Sh. 3*0.

121 The N.P.D. of this pair (19° 4′) is obviously wrong, as from the description it must be in *Aquarius.*

125 The measures are given, it being simply noted as Class I. In looking for new doubles I recently found this, and estimated P = 275° D = 2″·5. It is Lalande 34048, 1ᵐ following and 21′ north of *λ Sagittarii.*

115 (*Bootis* 76), *add* S. 660.

123 This is 19 *Canis Majoris*. The distance is about 10″. Given as Class II.

138 Recorded without measures as Class I. Peters in observing a minor planet found and measured a double-star which is undoubtedly identical with H. N. 138. He gives P = 331°·8; D = 4′ (*Astron. Nach.* 1635.) The place agrees closely with Herschel, and I have not been able to find any other double-star in the neighbourhood.

In the catalogue in order of Right Ascension, general number 289 (H I. 24), the North Polar Distance given as 73° 59′ 24″ should be 71° 59′ 24″; and No. 541 (H V. 11), given as 38° 44′ 3″ should be 34° 44′ 3″.

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## *On the most Probable Result which can be derived from a number of direct Determinations of Assumed Equal Value.* By E. J. Stone, M.A., F.R.S., Her Majesty's Astronomer at the Cape.

Let $x_1\, x_2 \ldots x_n$ be $n$ direct measures of the same quantity: each apparently equally good and, by assumption, to be considered as each equally probable. Each measure is therefore, *à priori*, by assumption equally likely to be the true result; each is equally likely by the assumption to differ from the true result by an assigned quantity. Positive and negative errors therefore must be considered as equally probable to the same amount: for the greatest or least of the direct measures is, by assumption, each equally likely to be the true result.

I assume as an axiom that since all the direct measures are by assumption of equal value, or equally good, the most probable value which can be adopted is that to which each individual measure equally contributes. To obtain the most probable value, therefore, we must combine all the independent measures in such a way, that an error which may exist in one of the measures, as $x_1$, shall produce the same error in the "value adopted as the most probable" as would be produced by the same error in $x_2\, x_3$ or $x_n$.

This appears to me clear. The probable discordance of each measure from the true result is the same, and this being the case, no good reason can be assigned why we should adopt a value in which an existing error, or arbitrary change, in $x_1$ should produce either a greater or less error, or arbitrary change, in the adopted value than would be produced by the same error or arbitrary change, in $x_2\, x_3$ or $x_n$. This condition of equal contribution of the independent measures to the most probable result appears to me necessary and sufficient.

Let $u = \phi\,(x_1\, x_2 \ldots x_n)$ be the value adopted as the most probable.